REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-8 and 25-30 are presently active. Claims 9-24 have been canceled without prejudice or disclaimer. Claims 1, 6, 8, and 25 have been presently amended. Claim 30 has been added. No new matter has been added.

In the outstanding Office Action, Claims 1-8 and 25-29 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1-3 and 7-8 are rejected under 35 U.S.C. § 102(b) as being anticipated by Scharvitz et al ("A combustion based MEMS thermoelectric power generator"). Claims 4-6 and 25-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Scharvitz et al in view of Wijngaards et al ("Design and fabrication of on-chip integrated polySiGe and poly Si Peltier devices").

Regarding the 35 U.S.C. § 112, second paragraph, rejection, the present claim amendments address the issues note in the Office Action. Claim 1 as clarified defines:

> 1. A micro thermoelectric gas sensor comprising:
> a membrane for heat shielding formed on a substrate; and
> ***said membrane having***,
> a catalyst material on the membrane that induces a catalytic reaction in contact with a gas to be detected,
> a thermoelectric conversion material film on the membrane that converts a local temperature difference produced by heat generation caused by the reaction into a voltage signal,
> a microheater on the membrane that heats the catalyst material for temperature control for facilitating stable gas detection of the gas sensor formed; and
> a high-temperature section and a low-temperature section of the thermoelectric film formed ***on the same membrane***. [Emphasis added.]

Thus, the issue identified in the Office Action as to which elements were on the membrane has been clarified. Hence, the 35 U.S.C. § 112, second paragraph, rejection has been overcome.

Applicants' Figures 1 and 3 (when considered together) show the placement of the catalyst material (e.g., PtTi), the thermoelectric material (e.g., SiGe), and the high-temperature section and a low-temperature section of the thermoelectric film on the same membrane. Applicants' specification, page 19, line 10, to page 20, line 15, describes:

> Furthermore, by forming a high-temperature section and a low-temperature section of a thermoelectric thin film on the same membrane, a gas sensor can be realized that enables concentration measurements with high sensitivity and high-speed response.
>
> Explaining the sensor in greater detail, FIG. 4 shows a response characteristic of a voltage signal and a difference in temperature between the high-temperature section and low-temperature section in a thermoelectric gas sensor at room temperature. Because the voltage signal demonstrates a response identical to the variation of temperature difference, the response characteristic is clearly determined mainly by the variation of temperature difference of the front surface. The voltage signal (left ordinate) on the left side and temperature variation (right ordinate) in FIG. 4A immediately become flat in response to hydrogen gas, and concentration measurements can be conducted. This is different from temperature variations in the high-temperature section and low-temperature section in FIG. 4B.
>
> When only the temperature of the high-temperature section rises and the temperature of the low-temperature section is fixed to the substrate temperature, that is, room temperature, then even if the difference in temperature between the high-temperature section and low-temperature section is the same, the variation becomes gradual as shown in FIG. 4B, and the response characteristic such as shown in FIG. 4A cannot be obtained (w. Shin, et al., "Li and Na-Doped NiO Thick Film for Thermoelectric Hydrogen Sensor", Journal of Ceramic Society of Japan, 110 (11), pp. 995-998 (2002)).

Art Deficiencies: The Scharvitz et al reference was applied in the Office Action for anticipating the elements in Claim 1. Applicants respectfully submit that all the features defined in Claim 1 on the same membrane are not disclosed or suggested by Scharvitz et al.

Scharvitz et al state on the first page in the text extending from col. 1 to col. 2 that:

> A thermopile spans from the center of the membrane (hot junctions) to the edge of the silicon (cold junctions). A catalyst, usually platinum, is deposited on the channel side of the membrane and is aligned with the hot end of the thermopile.

Scharvitz et al show in Figure 1(b):

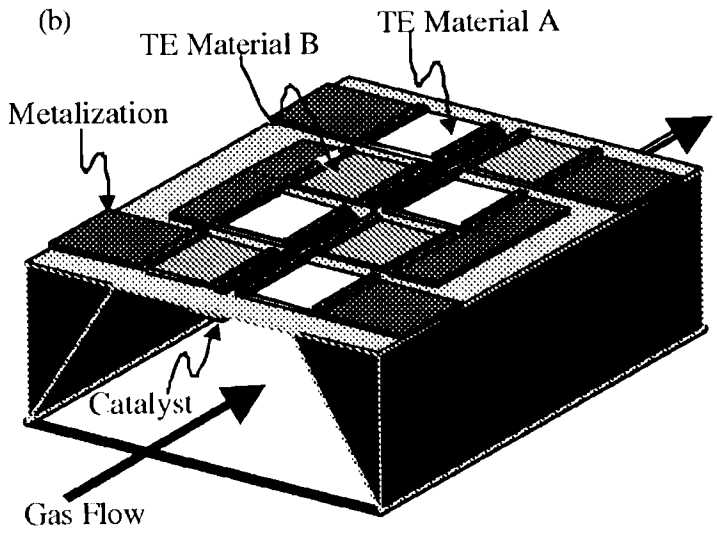

Figure 1: *(a) Micrograph of Device*
(b) Diagram of Device

With Scharvitz et al teaching that the hot junctions are in the center of the channel and the cold junctions are at the "edge of the silicon" (and thus not on the membrane), Scharvitz et al do not disclose or suggest the claimed combination of a catalyst material, a thermoelectric film, and a high-temperature section and a low-temperature section of the thermoelectric film on the same membrane, as defined in Claim 1. Furthermore, as explained above from Applicants' specification, "when only the temperature of the high-temperature section rises and the temperature of the low-temperature section is fixed to the substrate temperature, that is, room temperature, then even if the difference in temperature between the high-temperature section and low-temperature section is the same, the variation becomes gradual as shown in FIG. 4B, and the response characteristic such as shown in FIG. 4A cannot be obtained." Hence, the unique structure of the claimed invention provides a function and capability not present in the structure of Scharvitz et al.

M.P.E.P. § 2131 requires for anticipation that each and every feature of the claimed invention must be shown in as complete detail as is contained in the claim. Given the

deficiencies in Scharvitz et al noted above, Scharvitz et al fails to anticipate all the elements of Claim 1.

The deficiencies in Scharvitz et al are not overcome by Wijngaards et al. Moreover, without the knowledge from Applicants' specification, as discussed above, one of ordinary skill in the art would have no motivation or otherwise no rationale to modify either of the Scharvitz et al or the Wijngaards et al structures to produce the claimed invention. Indeed, M.P.E.P. 2141 II indicates that, in short, the focus when making a determination of obviousness should be on what a person of ordinary skill in the pertinent art would have known at the time of the invention, and ***on what such a person would have reasonably expected to have been able to do in view of that knowledge***.

Thus, without Scharvitz et al or Wijngaards et al individually or in combination providing the details of the claimed micro thermoelectric gas sensor and without a person of ordinary skill in the art at the time of the invention knowing of the advantages discovered by the inventors, Claim 1 when considered as a whole is not anticipated nor made obvious in view of the art of record.

Hence, Claim 1 and the claims depending therefrom are believed to contain allowable subject matter and should be passed to allowance.

Dependent Claims 25, 27, and 30: Dependent Claims 25, 27, and 30 set forth features further removing the claimed invention from the art. The features in amended Claim 25, previously presented Claim 27, and new Claim 30 are supported by Applicants' Figure 3. In particular, the Examiner's attention is invited to consider that, in these dependent claims, the catalyst material is defined to be a periphery of the membrane. Scharvitz et al show their catalyst to be in the center of their channel structure and not at a periphery of the membrane. Wijngaards et al were cited in the Office Action for an asserted teaching of a "metallization

layer near the outer periphery of the membrane/thermopile areas." Yet, even if this metallization layer is taken to be a catalyst layer, then Wijngaards et al would still not disclose or suggest a thermoelectric conversion material film extending in a linear section from a region of the catalyst material on a periphery of the membrane to a region of the microheater on an opposite periphery side of the membrane from the catalyst material.

Thus, full consideration of dependent Claims 25, 27, and 30 is requested.

Conclusion: In view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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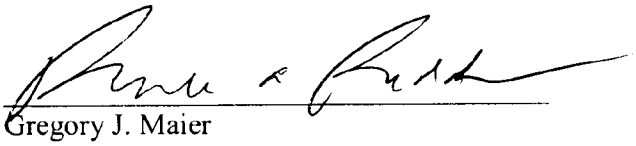

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